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TRAINING MODULE: RAPID NUTRITION
RECONNAISSANCE

by J. Douglas Uzzell, Ph.D.

DEPARTMENT OF AGRICULTURE
AGRICULTURE

United States Department of Agriculture
Office of International Cooperation and Development



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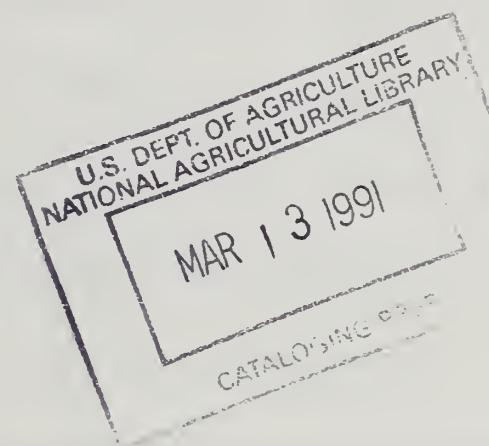


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RECONNAISSANCE

by J. Douglas Uzzell, Ph.D.

July, 1982



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RAPID NUTRITION RECONNAISSANCE

Introduction

Rationale

This unit explains the use of rapid micro-surveys for assessing nutritional status and nutrition-related behavior among populations felt to be at nutritional risk. It suggests ways of sampling to permit maximum generalizability from the data obtained and gives a number of suggestions for carrying out the surveys themselves, including selection and training of field workers. Although the focus is on rural areas, most of the methods could be translated to urban areas as well. This kind of research has been shown to be effective when time and/or funding for large-scale surveys are lacking and when macro-economic studies are unable to pinpoint the exact distribution of malnutrition and the cultural-economic conditions which affect it.

Objectives

At the completion of this unit, participants will be able to:

- * Explain the conditions under which rapid reconnaissance is an appropriate data gathering technique.

- * Explain the advantages of micro-studies in planning, implementing, and evaluating nutritional intervention projects.
- * Supervise purposive, stratified sampling in order to maximize the generalizability of the results.
- * Supervise selection and training of field researchers in such a way as to maximize access to informants and comparability of data, and to minimize the intrusion of observer biases.
- * Choose among available research techniques in such a way as to make optimum use of available time and funds, while obtaining the most useful data under the constraints.

Evaluation

During this unit, participants will be evaluated on their achievement of the objectives by:

- * Correct completion of the purposive sampling exercise.
- * Evaluation by the instructor of the participants' display of understanding of the material during group discussions of the various units.
- * Evaluation by the instructor of the participants' understanding of concepts involved in the role-taking exercises.
- * Assessment by participants of their own progress.

Activity 1
Independent Reading

Lance Taylor, "Research Directions in Income Distribution, Nutrition, and the Economics of Food." (supplied)

This article is directed at a theoretically oriented audience and is not intended to occupy a major portion of the participants' time in this unit. If time is short, the instructor may suggest that participants skip from page 34 to the "Micro Issues" section of page 38. The major points to be made are as follows:

- * Macro-economic studies and micro-studies are not substitutes for each other, but rather address different issues.
- * Micro-studies may point to hypotheses that are best tested by macro-studies. Similarly, micro-studies may reveal mechanisms by which effects measured in macro-studies come into being.
- * (not included in this article) In most developing countries, national income and agricultural production statistics are at best only loosely indicative of household economies and the productivity of small farmers.
- * Cultural beliefs and practices and socio-economic linkages at the "ground" level influence the distribution and consumption of food, in addition to prices, income, and supplies.

* Among other things that are poorly understood is the distribution of food within households; this must be known in order to discover population sets that are particularly at risk, such as pregnant or lactating mothers, male or female children, etc.

Activity 2 Discussion

After having read the Taylor article, participants should be encouraged to discuss the amount of information available in the countries in which they are working or have worked about household income and consumption patterns among small farmers and farm laborers.

Activity 3 Independent Reading

Robert E. Rhoades, "The Art of the Informal Agricultural Survey."

This article is a practical guide for rapid field reconnaissance in rural areas. It is not aimed at nutrition studies, but at agricultural surveys. Part of the information in it pertains to sampling. Part pertains to field research techniques. Points important to sampling will be

stressed in this section. The others will be stressed in the section on field methods. Points to be stressed in this section are the following:

- * A great deal can be learned about a region that will aid in sampling. This information can come from previous research, government statistics, aerial photographs, and "windshield surveys."
- * Before beginning, one should know about rainfall, soils, population, markets, land holding and land use patterns. (This information is supplied in the following exercise.)

The instructor should also make the following points supplementary to those made by Rhoades:

- * Knowledge of income of small farmers and farm laborers will usually require information about crops, livestock, land under cultivation and estimates of its productivity, but also kitchen gardening, minor livestock (often in the care of women and children), gathering of wild foods and herbs, non-market exchanges of goods and services, informal sector economic activities, and temporary wage labor by members of the household.
- * In the kind of research indicated, it will be best to use teams composed of one male and one female field worker, the

male to have access to male farm workers, and the female to have access to female food preparers and providers.

Activity 4 Stratified Sampling

In this activity, we will select eight sites for field study. We will do this on the basis of what we know about differences among sites that are likely to affect nutrition. This is called purposive sampling. If we knew nothing in advance and wished to draw a statistically useful sample, we would draw a random sample in which each household, village, or other unit had an equal chance of being selected. This would require a much larger sample, which would render the rapid reconnaissance unfeasible. Or if we simply drew eight villages at random, we could have far less confidence that the eight villages were representative of villages in the region as a whole.

Information supplied about the fictitious region has been greatly simplified for the sake of the exercise. Actual regions will probably be much more complex. In this exercise, information is supplied for population size, agro-ecological zones, access to markets, ethnicity, and cultural-economic practices. In actual practice, other factors would probably intervene.

For the sake of this exercise, it is assumed that time and funding constraints limit the project to eight field workers for a period of 5 weeks. For reasons that will be explained in the following section on research methods and field worker training, we will assume that 1 week will be given over to training, that the field workers will operate in teams of one man and one woman in each village, and that the time spent in each village by each team will be 2 weeks.

Finally, notice that in this exercise only one solution to the sampling problem is provided. In actual practice, or even in this exercise, other solutions are possible. Also, in a real situation, information gained early in the study might well dictate changes in site selection as the study progresses.

The Region

The target populations are small to medium agriculturalists with land holdings ranging from 10 to 2 hectares, classified as irrigated, humid, or marginal. They raise some dairy cattle, as well as minor livestock and kitchen gardens.

Ninety percent of the population live in villages ranging from 1,000 to (in the case of a few market centers) 5,000 population. The mean village population is 1,500.



There are 73 villages in the target area, four of which are market centers.

Not all of the villages are equally well integrated into the regional market system. Those which are more distant from market centers and roads consume fewer consumer goods and go less far afield to seek temporary work.

Two linguistic/cultural groups are represented, Group A and Group B. There are 23 Group B villages and 50 Group A villages.

The ecology of the area can be roughly divided into two zones, one relatively flat with some annual flooding and a high water table, the other hilly to mountainous. Both areas produce grains and legumes, but in different proportion; and average annual yield differs between the two areas.

Fifty of the villages are in the lowlands and 23 are in the highlands. Of the highlands villages, 17 are Group B and 6 are Group A. Of the lowlands villages, 42 are Group A and 6 are Group B. All four of the market centers are in the lowlands and are dominated by Group A.

Choosing A Sample
(Quick and Dirty Method)

Step 1: Determine how many sites are to be selected. This has already been done. The number is eight.

Step 2: Lay out in tabular form the characteristics of the possible sites. (In this exercise, we will ignore the 10% of the population who do not live in villages, and villages will be the units of study.)

There are a total of 72 villages. There are two agro-ecological zones. There are two ethnic types. We have divided the population into two types in terms of level of integration into the market economy. We have divided the villages into market centers and non-market centers. The information is summarized in Table 1.

Step 3: Decide which characteristic we think will be the most important determinant of nutritional status. For the sake of this exercise, let's say that this characteristic is agro-ecological zone. Fifty out of 73 villages are in the lowlands, or roughly 68%. Sixty-eight percent of 8 (the total number of sites to be selected) is 5.48. Since we cannot divide the number of sites into fractions, we round off and decide that 5 of the sites will be in the



Table 1

<u>Site Type</u>	<u>Number of Sites</u>	<u>Popula- tion</u>
Lowland, integrated, Group A, market center	4	20,000
Lowland, integrated, Group A, non-market	28	42,000
Lowland, non-integrated, Group A	12	18,000
Lowland, non-integrated, Group B	6	9,000
Highland, Group A	6	9,000
Highland, Group B	<u>17</u>	<u>25,500</u>
Total	73	123,500

lowlands and 3 will be in the highlands. Actually, we could have "rounded" up, but this would have left only two sites in the highlands.

Step 4: Decide what the next most important characteristic is. Let's say that this characteristic is degree of integration into the market system. Of the 50 lowland villages, 32 (64%) are considered to be integrated. Therefore, we determine that 64% of the lowland sample, or three sites, should be drawn from the integrated villages. Since none of the highland villages are integrated, we need not subdivide that sample at this point.

Step 5: Decide the next most important characteristic. Let's say that it is ethnicity. In the highlands, 6 out of 23 villages are Group A. This amounts to 26% of the highland villages. Twenty-six percent of the three highlands sites should thus be Group A villages. This works out to be .78 villages. Again, we round off and say that, of the highlands sample, one site will be Group A and two will be Group B.

In the lowlands, the situation becomes more complicated. Do we take the percentage of Group B villages as a whole, or as a percentage of lowlands villages that are

unintegrated into the market system? Since none of the Group B villages is integrated, let's take the percentage of the total lowland unintegrated sites. This is 8 out of 18, or 40%, so we say that one unintegrated lowland site will be Group B and one will be Group A.

Step 6: Finally, we come to a real judgment call. The number of market centers in the lowlands is 4, or 8% of the total lowlands sites (although they contain 22% of the population). Since 8% of 5 sample sites would be less than half, perhaps we should not include this characteristic. If we take the percentage of integrated sites, 4 divided by 32, or 12.5%; 12 1/2% of 3 (the number of lowland integrated sites) is still less than half. What are we to do? This depends ultimately on how important you feel that residence in a market center is as a determinant of nutritional status. However, in the present case, because there would still be two sites that were lowland, integrated, Group A, and non-market centers, and because of the relatively large population, it would probably be a good idea to choose one market center as a research site.

Step 7: Now we know how many sites of each category we want to select for research. Next, we number the sites in each category from 1 to N (the total number in the category); then, using a table of random numbers, we select the sites for each category. While we are at it, we should select one or two alternative sites for each category in case it should become impossible to work in one of the first choices. This is an important step. Should we choose the sites casually, even after this degree of stratification, it would likely be on the basis of accessibility, having a contact in the village, or some other factor that would bring hidden biases to the sample.

An Alternative Method

If our information on causes of nutritional status were more extensive, we might want to develop scores for all the villages and rank them on the basis of the scores, and then take one site from the highest ranked one-eighth, one from the second highest, and so on. There are a number of difficulties involved here, however. First, our knowledge would have to be very precise for us to give a score, for example, on ethnicity. Second, we would need to know that combinations of certain characteristics would not

cancel each other out, or, in other words, that the effects of all the characteristics were cumulative. Third, we would be hard-pressed to make decisions if the scores were not more or less evenly distributed along the scale; for example, if 10 villages were within .50 of 9 on a scale of 1 to 10, and the other 63 villages were within .50 of 2 on the same scale.

Summary

The following table summarizes the results of the sampling done in the exercise.

Notice that the various categories are not equally represented. However, with the exception of the market towns, if we had simply taken 11% (the total sample divided by the total number of villages) of each of the categories and rounded off, we would have gotten the same distribution of sample sites.

This sample, although a great improvement over a simple random sample, should still not be considered as the basis for complex statistical inferences about the population as a whole. That would require a great deal more prior information and considerably more confirmation of our assumptions about causes of nutritional status.



Table 2

<u>Site Type</u>	<u>Total</u>	<u>Sample</u>	<u>Percent</u>
Lowland, integrated, Group A, market center	4	1	25
Lowland, integrated, Group A, non-market	28	2	7
Lowland, non-integrated, Group A	12	1	8
Lowland, non-integrated, Group B	6	1	17
Highland, Group A	6	1	17
Highland, Group B	<u>17</u>	<u>2</u>	<u>12</u>
Totals	73	8	11

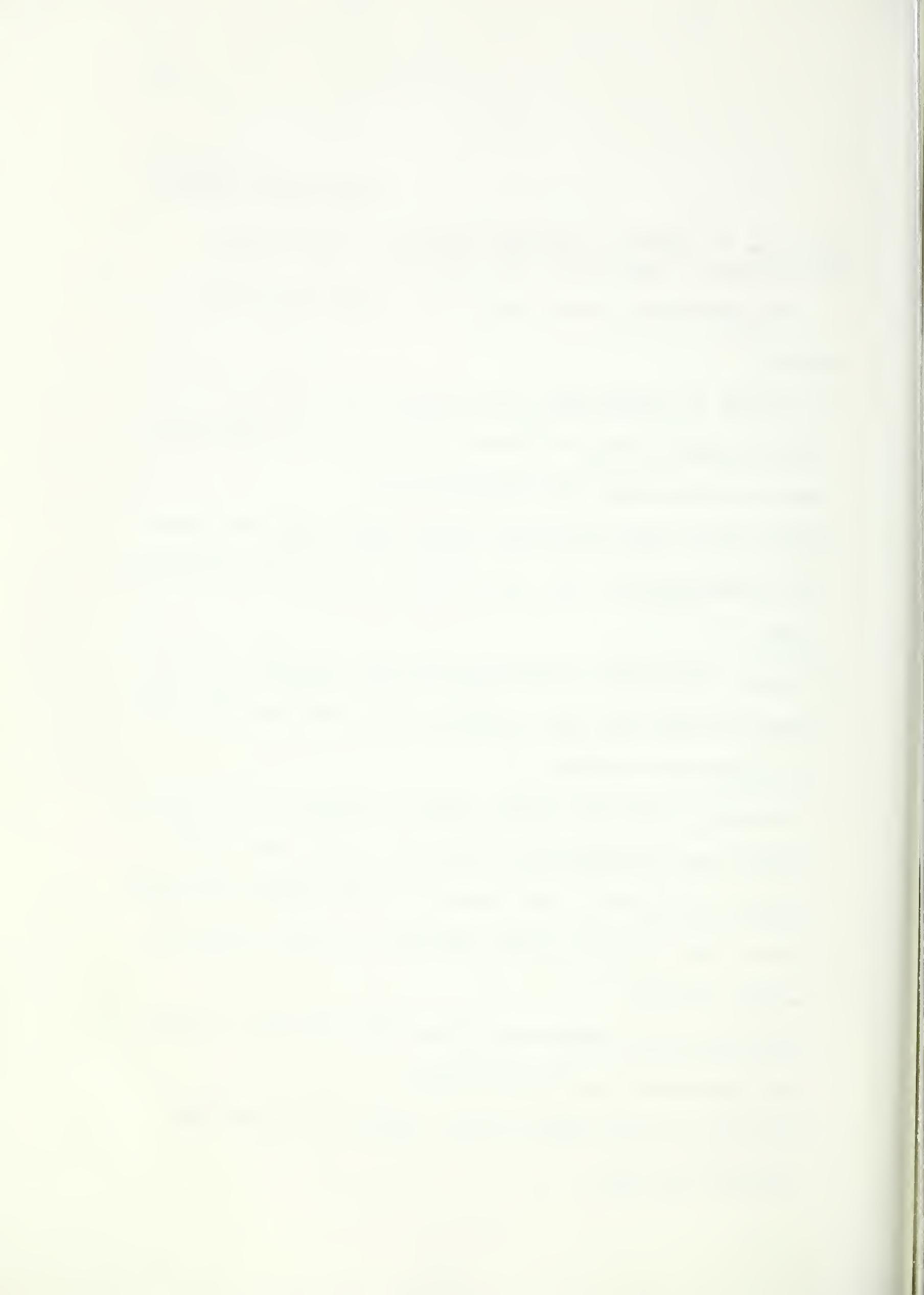


Activity 5
Independent Reading

Christine S. Wilson, "Research Methods in Nutritional Anthropology: Approaches and Techniques," pp. 62-65.

The following points should be stressed from this article:

- * A variety of techniques is available for directly or indirectly quantifying the food consumption of individuals. Each has advantages and disadvantages.
- * Twenty-four hour or 12-hour recall interviews are quick and comprehensive, but less accurate than direct observation.
- * "Person following" is potentially more accurate, but is time-consuming and the presence of the observer may bias the observed behavior.
- * Visiting at mealtime gives access to distribution of food within the household, but leaves out snacks and other casual consumption, and requires a high degree of acceptance. The presence of the observer is again a possible source of bias.
- * Observing food preparation allows the observer to note the ingredients in various dishes.
- * Analysis of menu items must be conducted outside the research setting.



- * There are several ways of quantifying portions; for example, through the use of scales, standardizing on the basis of the average contents of locally used utensils, and measuring plate waste.

Activity 6 Lecture

In this activity, the instructor will integrate several points from the readings, as well as adding additional points, particularly about field methods and field worker selection and training.

Points to be Covered in the Lecture

Field Methods in General

Points not previously stressed from the Rhoades article:

- * Entry into a village should be done only with the knowledge of local officials.
- * One should be able to speak the local language and must observe locally accepted forms of address, conversation, and general politeness.
- * One should not use formal interviews, but instead casual conversation, carefully steered to topics of interest.



- * One should learn about daily and seasonal routines in order to find times and places when people are most readily available for conversation.
- * Key informants can and should be used, but not relied on entirely.
- * What people believe and know about their own life practices is useful information.

Supplementary points:

- * Entry into the village is probably the single most crucial point in field work. Attitudes of suspicion, hostility, or at best reserve are commonplace and understandable.

Ethnographers engaged in long-term field research often report periods of months before they are accepted fully by the inhabitants whose behavior they are studying. The brevity of the field work in rapid reconnaissance makes it doubly important that entry be achieved successfully.

This can be enhanced by letters of introduction from known officials, accompaniment by such individuals, and initial accompaniment by the research director. The critical objective is to make sure that village leaders and other residents understand fully the purpose of the research, and that they accept the identity of the field workers.

Where possible, it is desirable to explain these things to



residents at a town meeting, because that will also reduce the number of times the field workers will have to explain themselves to individuals. If entry and acceptance are not achieved, it may be necessary to move to an alternate site, after reviewing causes of failure in the first one.

* The field worker's behavior should be very circumspect.

In dealing with people of a culture different from one's own, it is very easy to give grievous offense for violations of etiquette of which one is not aware. The short period of the reconnaissance study will not be adequate for learning full cultural proficiency.

* In most societies, the gender of the field worker will constrain the worker's access to members of the society.

That is the reason for suggesting in the sampling exercise that each team should consist of a man and a woman.

* Key informants are essential in this kind of research.

However, they should be chosen for the kind of access to information they have and the biases they have in supplying that information, not for their willingness to talk to the field worker. The first, most willing informant, is probably marginal to his/her society. In some cases, village officials, such as a village secretary, may have



access to detailed information about such economic information as land and livestock holdings and relative productivity. However, it should be kept in mind that such official information may be deliberately distorted to avoid taxes, envy, or other undesirable consequences.

* To the greatest extent possible, the field worker must expunge from his/her mind all pre-existing stereotypes --both positive and negative-- the worker may hold about the people being studied. Stereotypes distort information. It is the peculiar characteristic of stereotypes that, while they can always be proven to be true, they are almost always false.

Socio-economic Information

* Generally speaking, information about farming practices and other economic activities is easier to obtain than dietary information, partly because the unit of analysis is larger and more general, partly because economic activities are more public than nutritional activities. This is true so long as you are not talking to a particular person about his own personal land holdings, crop yield, or income. (Remember that, in many parts of our own society, it is considered vulgar to discuss one's income.)



- * Regarding crops, planting and harvest times, average yields on various kinds of land, costs of raising livestock, etc., it is often desirable to engage in a group discussion, producing thereby a kind of Delphi effect in which various speakers modify each other's estimates and eventually reach consensus.
- * These and other types of conversations can be used to elicit information on seasonal variations in availability of various kinds of produce, energy demands, etc.
- * For most small farmers (1 to 5 hectares), a complete economic profile requires information about income from temporary wage labor and informal sector activities. This should be collected in the form of annual work histories for all productive household members. These should go back several years.
- * Even apparently homogeneous farm villages usually have some range of income. Knowing this range is essential for sampling within the village for intensive nutritional studies. Key informants are often able to identify prosperous, poor, and ordinary households. Their labelings, however, should be checked against the testimony of members of other categories than the one in which they place themselves.



- * In the absence of competent key informants, it is sometimes possible to rank households economically on the basis of house size and appearance as well as certain diagnostic possessions, such as appliances.

Nutrition Information

- * The field worker should sample among households categorized by relative economic well-being.
- * If recall interviews are used, 12 hours is usually more reliable than 24 hours.
- * Observation of eating habits should alert one to consumption of items that are not locally considered as food, including snacks, use of stimulants, and nibbling flakes of whitewash.
- * Inquiries about diets should include questions about seasonal variability and questions to determine how representative of the annual average the diet is at the time of the study.
- * Decisions of which combinations of data gathering techniques will be used will depend upon the field worker's acceptance and access to otherwise private activities.
- * A pre-reconnaissance reconnaissance may be necessary to collect locally used utensils for standardizing measurements.

Selecting and Training Field Workers

Obviously not everybody is suited by skills or by temperament to do this kind of field research, which requires a combination of sensitivity, audacity, imagination, determination, patience, and the ability to listen, coupled with good judgment, objectivity, and the ability to tend to details. In most cases, they will also need to be proficient in the local language. A research director must not only possess these same qualities, but also be able to recognize them in others.

Most of the participants in the training session will be twice removed from the field researchers themselves. Yet it is necessary, not only to the success of the project at hand but in many cases to the future of projects in the region, that the field workers at least not create serious blunders. In a project of long duration, it is possible to weed out incompetent researchers, discarding their data and substituting others. In a rapid reconnaissance, this is not possible. Here are some suggestions for selecting and training field workers for short studies:

- * First, try to find people with field work experience, preferably among people with the same cultures as those in the project area. However, this does not guarantee competence.



- * In screening interviews, probe for attitudes toward the categories of people who will be studied. These should be as free of bias and stereotype as possible.
- * Confront the prospective field workers with hypothetical situations for which they must devise creative solutions.
- * If possible, involve the prospective field workers in field situations at sites that will not be part of the study sample.
- * In these situations and during and after the study, observe the field worker in action, and interview people at the site to get their evaluation of the field worker's behavior. Give the field worker feedback from this process and observe to see if performance improves.
- * Where nationals are hired to do the field work, two situations in particular must be considered. First, there is an almost universal bias by urban people against rural people. Second, there may be patterned ways of behaving between class and ethnic groups in a particular society. In many cases, these culturally conditioned ways of thinking and behaving may be more difficult to break for a member of the society than for a foreigner. People hired as field workers in a rural area are likely to be of different cultural and economic background than those they



are hired to study. On the other hand, members of the society, however distinct they may be from their informants culturally, may bring cultural knowledge and language skills to the task that far outweigh other disabilities.

Activity 7 Role Taking

In the remaining time, participants are to assume complementary roles and act out an imaginary interaction of one of the kinds suggested below. It is recommended that only two of the participants engage in role playing at a time, while the remainder observe and make suggestions for improvement or change.

Roles/Situations

FIELD WORKER CANDIDATE/RESEARCH DIRECTOR. The prospective field worker is interviewing the project director for the fictional project described in the sampling exercise. The project director is trying to ascertain whether or not the candidate will make a suitable field worker. The candidate is a student at the national agronomy school.



VILLAGE HEAD/FIELD WORKER. The field worker is first presenting him/herself to the village head, seeking permission to work in the village for 2 weeks. The village head is skeptical, suspicious, and apprehensive of taking responsibility for giving his permission. A third participant may want to act as research director.

FIELD WORKER/HOUSEWIFE. The field worker is seeking to have the housewife participate in a 12-hour recall of family food intake, as well as allowing the field worker to observe her cooking, and perhaps one or more family meals as well. The field worker may offer compensation.

FIELD WORKER/KEY INFORMANT. The field worker is trying to learn from the key informant what socio-economic categories exist in the village, how many households fall into each category, and what the general dietary characteristics are for each.

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CONTENTS

Supplement to Fleuret Article, for participants

Activity 9 -- Questionnaire Design (red label)

"QUALITI" Interviews, for participants and instructor

Notes for instructor

Sampling and Survey Case, for participants

Activity 10 -- Purposive Sampling (blue label)

Notes to instructor

In-Class exercise, for participants and instructor

Team exercise, for participants

FILE

FOR THE INSTRUCTOR--
NOT TO BE HANDED OUT TO PARTICIPANTS

ACTIVITY 9

The QUALITI method of questionnaire construction is, of course, not the only possible approach, but it is one that has worked well in the past. If nothing else, it provides a structure, and any structure is probably better than none. Also, the acronym has mnemonic value.

In the exercise, the participants will not be able to take the last three steps (in the absence of native informants), although if time permits they may simulate the steps with someone playing native informant. It may be useful here to have them recall questionnaires to which they have tried to respond in the past that contained meaningless or ambiguous questions or offered alternative answers, none of which actually represented their true response. This is also a good time to suggest that questions be limited to items with concrete answers--places, dates, amounts--rather than opinions, impressions, etc. Open-ended questions can also be discussed at this point.

ACTIVITY 9 -- QUESTIONNAIRE DESIGN:"QUALITI" INTERVIEWS"

What follows is a logical procedure for developing interview schedules. The procedure is broken down into seven steps that form the acronym QUALITI.

Question. The first step is to ask oneself what questions, in the most general sense, need to be answered. Each general question should then be broken down into its component parts and so on until the most concrete level is reached. For example, you might want to know, at the most general level, what a family consumes in an average year. You might break this down for primary and secondary foods, seasonal variations, and intrafamilial variations. Each of those in turn can be further decomposed.

Unit. Once the questions are broken down, you must decide the interview unit: Will your interviewer talk to the whole family or a single person? Who should that person be? Is it reasonable to expect that such a person will cooperate with your interviewers?

Answers: Once you know roughly what questions you want answered and the unit or person from whom you will seek the answers, it is time to make a first assay at deciding what kinds of answers you can expect and how you will interpret them. Here you might consider



the conditions under which the interview will take place and whether or not the conditions are likely to influence the answers you will receive. For example, if you are asking a farmer who has received fertilizer as an incentive for planting a particular crop if he has planted that crop, he is likely to say yes, whether or not he has really done so. This is also the (first) place to question whether or not the respondent is likely to have the information necessary for answering the question correctly. (Remember, the problems raised about 24-hour recall interviews.) If answers are likely to involve non-standard measures, this is the time to begin figuring out how to convert them to standard measures.

Limitations. Usually, we want more information than our respondents have time to give us, or more than we have time to collect and analyze. Here is where we begin to pare the developing interview down to size. The following questions are crucial:

- a. How much time will the interviewer have for each interview?
- b. How much time can we expect the respondent to spend with the interviewer?
- c. How many questions can we ask in that time?
- d. What are our priorities among the questions?

This step will probably have to be repeated later when the actual questions are developed.



Phrasing. This step is most often neglected, but it is extremely important, especially since we are talking about interviewing rural residents of Third World countries. Language and dialect problems are only the most obvious ones. Also to be considered are such questions as whether or not the phrasing is embarrassing or meaningless to the respondent. Wherever possible, a person of the same social category as the anticipated respondents should be called upon to collaborate at this stage. Again, we are talking about more than mere translation of questions already phrased. A general procedure is to explain to the native informant what you are trying to find out and ask the native to rephrase the question in order to elicit the information.

Trials. In more rigorous circumstances, this step is referred to as a pretest. What we are doing here is simply trying out the interview schedule to see if it works. It is at this stage that you will discover that the interview takes too much time, that certain questions are repeatedly not answered or misunderstood, or that the answers to particular questions are so vague as to be useless to you. Not only should you quiz your interviewer about how the interview went, but also whenever possible it is a good idea to go over the questions with some of the respondents to see what meaning they gave to the questions and what their answers meant. This is also the time to



alter limited option questions so that the options are meaningful and exhaustive.

Interpretation. After you think that the schedule is ready to go, inventory the answers that you are likely to receive and determine whether or not they give you enough information to answer the original questions. If not, go back to step one.



ACTIVITY 9

SAMPLING AND SURVEY CASEThe Situation

The government of Tanzania has decided to encourage increased cotton production by offering a package of incentives. This is expected to affect primarily Tabora, Shinyanga, Mara, and Mwanza. All three regions showed a net deficit in production of preferred grains between 1974 and 1977, but managed a net surplus between 1977 and 1980. The government would like to increase cotton production without slipping back into a deficit of grain production. Also, it is hoped that reduction of food production in local villages will not lead to intolerable levels of nutritional deficiency, as farmers shift from food to cotton, and as local scarcities drive up prices in the informal market.

Of particular concern is Tabora, where in 1969 63% of income went to food and 42% of that food was grain. Tabora is adjacent to grain-rich but remote Rukwa, which currently sells a relatively large percentage of its corn to the NMC because of its remoteness from urban areas. To counter price rises in the informal market for food between Rukwa and Tabora, NMC will offer incentives to local entities to make goods available in rural Tabora.

For rural Tabora, then, we would like to know the following:

1. Amount and distribution of primary and secondary foods within the family;
2. Sources of food, i.e., homegrown, purchased through informal market, purchased through NMC;
3. For purchased food, a comparison of prices on the informal and formal market, and the portion of income going to food;
4. How these change after the new program is put into effect.

Group Problem

Design an interview schedule that will elicit the desired information and any other information that you consider important.

FILE

MATERIALS FOR PARTICIPANTS

SUPPLEMENT TO FLEURET ARTICLE

The article by Patrick Fleuret, reviewing community level trends and policy implications in nutrition in areas undergoing agricultural development, raises general issues and makes general suggestions for avoiding frequently encountered problems. The following is abstracted from a case history of such a situation in a South American country. The purpose of this abstract is to give a concrete example of the manner in which some of the problems Fleuret discusses can occur, to point out some of the inadequacies in monitoring and evaluating the project that have led to a lack of appropriate intervention, and to suggest kinds of monitoring that might correct some of the informational inadequacy.

The Case

The case involves an area in a South American country that historically was characterized by both large and small scale agricultural and livestock production. Since the early decades of this century, loans and development projects of one kind or another have gradually transformed the area into a major producer of commercial crops. This process was accelerated after 1941 by a variety of programs funded by private foundations, particularly the Rockefeller Foundation, and more recently by AID programs. The programs have ranged from

educational/research development to underwriting national development agencies. They include medical as well as agricultural focuses. The large farms are all owned by nationals, but loans from the United States and the World Bank have provided much of the development capital.

Development of the area began in the 1920s following construction of roads, using U.S. loans, that made it possible to transport crops and animals to market. Large landholdings expanded during the 1920s at the expense of small holdings, to make way first for cattle production and then for sugar cane. Cane production has continued to increase in importance, particularly since the 1950s. In recent decades the national extension service, funded by USAID, has introduced new farming methods that have substituted open-field, mechanized, monocrop cultivation of soya, sorghum, beans, and corn for the traditional crop mix of cocoa, coffee, plantains, and fruit trees. In the area as a whole, land devoted to cash crops increased five-fold between 1958 and 1970. Sugar production increased 1.5 times between 1950 and 1960, and doubled between 1960 and 1974, to reach 853,460 metric tons. In one subarea singled out for intensive study, four plantations--owning 80% of the cultivated land--enjoyed an increase in sugar cane production from 2,000 tons in 1938 to 91,750 tons in 1969, and the increase has continued.

Partially as a byproduct of this development, there has been an increase in pollution from sugar mills, the number and size of small

landholdings have diminished, and malnutrition appears to have increased. In the early 1970s, according to height/weight surveys, 50% of the population under age 6 were deemed to be malnourished. Nevertheless, those charged with evaluating the program have considered it overall to be a success. Clearly, production increased, and one report suggested that a particular community could remedy its protein deficiency by retaining and consuming 7% of its soya crop and 8% of the total calories it now sells. Others have suggested that the real cause of malnutrition is population increase. Along with other programs in the area, educational programs have attempted to foster changes in dietary choices and to promote birth control. Neither of these approaches has shown appreciable success to date. More recent plans have been to intervene with credit for small farmers, although the proposed lower limit (20 hectares) would eliminate most families suffering nutritional stress. Further, the national government is experimenting with direct intervention through a food coupon program.

Difficulties

1. Loss of land and loss of variety of crops. Peasants in the area have been losing land to large landholders since the beginning of the century. This has accelerated as the cost of farming has increased. In the area studied intensively, a third of the land under peasant control in 1972 had passed to the sugar plantations by 1976.

Of the land still controlled by small farmers, somewhat less than half is devoted to cash crops. The result is a net loss of production of such foods as cassava, plantains, beans, panela, corn, and potatoes.

2. Loss of wage income. Wages have not kept pace with profits, which range from 26% for sugar plantations with mills to 54% for those without them. Suppression of wages is made possible by hiring practices (crew contracting), piecework payment, and the fact that workers with some land (although not enough to support their families) are able to augment their earnings with their own agricultural production.

3. Increased caloric requirements and changes in distribution of food within family units. Labor on the sugar plantations requires approximately twice the caloric expenditure per worker that is expended on peasant agriculture. Among families who are at the margin of caloric sufficiency, this means that calories must be diverted from family members who are not working on the plantations, if workers are to be able to continue working.

4.. Atomization of the "community." There is a tendency to assume that any aggregation of peasant households represents a community in the sense that the community makes joint economic plans and that goods and services are distributed among members through non-market mechanisms. Although this may have been typical in some parts of Latin America during the colonial period, such communities are increasingly rare and even so-called "closed corporate communities" tend to



atomize quickly once they are brought into the cash economy and their members become wage laborers. In the area studied intensively for this example, the atomization process began as early as the 1920s, and presently a process of stratification is underway. In the community, 30% of the households had no land in 1971, and an additional 50% had fewer than 2 hectares. The household or extended family, not the community, is the unit that acts collaboratively on economic issues. Thus, prescriptions, such as that made by the extension service that the community withhold a percentage of its cash crop for its own consumption, are meaningless first because goods are not shared among community members and, second, in this case fewer than half the households in the area have any cash crop to withhold. Food producers are unlikely to distribute their surpluses to their landless neighbors except through cash sale (in which case they are not withholding it from the market).

Suggestions for Improved Monitoring

1. Changes in land use and land tenure. While the factors most consistently and clearly associated with nutritional stress in areas undergoing agricultural development are (1) taking land out of cultivation of traditional foods crops and (2) removing land from the control of small scale producers, it is no doubt unrealistic--on both political and economic grounds--to suggest that in most cases this trend could be reversed. In many areas, in fact, there is historical evidence that



until small farmers are stripped of their land, they are reluctant to join the wage labor force. Nevertheless, changes in land tenure and land use can provide early warnings of nutritional problems to come.

2. Self-reporting of land use. Where peasants are given incentives for growing certain crops, there is a tendency to report such use whether or not it is true. In the present case, there was a discrepancy of 20% between the number of households reporting to government interviewers that they grew soya, and those actually found to be doing so during long-term investigation.

3. Changing food preferences. In cases where resistance to consumption of a non-traditional food is strong, as in the present case where soya is regarded as cattle fodder unfit for human consumption, it might make more sense to encourage some local farmers to increase production of traditional foods for the local market than to spend large sums of money and energy attempting to reeducate the consumers.

4. Unit of analysis/point of intervention. The particular pattern of production and distribution in a particular rural community should never be taken as given. At the very least, attention should be paid to monitoring food consumption (and other factors) among people in various socioeconomic categories. Later in the training session, suggestions will be made for discovering and sampling these strata.

Interventions above the level of those who are experiencing nutritional stress (as in the case of loans to farmers with more than 20 hectares in the present case) is more likely to generate further

concentration of landholdings and wealth, rather than to produce a "trickle-down" to the lower strata.

5. Intra-familial distribution of food. Nutritional surveys should seek information on overall consumption of food for households, but should also look for seasonal variations in the availability of both food and money to buy food, and the distribution of food within families. Because farm wage labor is likely to be seasonal, an attempt should also be made to discover which members of the family are engaging in wage labor and when (and also whether or not) high caloric demands during working periods may temporarily diminish the food going to non-employed members of the family. All this will make direct nutritional intervention more efficient.

6. Anthropometric indices of nutritional adequacy. Standard anthropometric surveys, such as weight/height studies, are of questionable value in determining whether or not a population is suffering nutritional inadequacy, unless baseline figures have been established for that particular population. However, once such a survey has been conducted, figures from the original data can be used for comparison with subsequent-surveys to see whether or not nutritional status has changed.

FILE

FOR THE INSTRUCTOR--
NOT TO BE HANDED OUT TO PARTICIPANTS

ACTIVITY 10 - PURPOSIVE SAMPLING

It will help clarify this section of the participants understand why certain criteria are being used to weight the samples. The point should be made that, if we do not know anything to begin with, we need a big enough sample for all possible factors to have a good chance of being represented. However, if we are already reasonably sure that certain factors do have an effect and we want to know about variations within groups when those factors are held constant, then we make sure that those factors are proportionately represented. On the other hand, if we know in advance that one ethnic group, for example, is better fed than another, we will want to make sure that those factors are proportionately represented. Otherwise, ethnicity might mask the effects of another factor, such as distance from markets. Also, in a small unstratified sample, sampling error could easily cause one group to be underrepresented and thus bias the results.

It may help to give an example of political pollsters who control for party affiliation, occupation, ethnicity, income, etc., based on voting behavior by people in those categories in previous elections. With the information from previous elections, they are able now to get accurate results using small stratified samples.

A simple example might be introduced early on: performance at

marble shooting by boys and girls, using for instance agates and steelies.

Participants should be walked through the first exercise as a group with assistance from the instructor where needed. After that exercise is complete, discuss how households should be chosen in each village, based on differences among households and the number of interviews the interviewers can complete in the allotted time.

Discuss ways of discovering intra-village differences among households: key informants, tax records, objective criteria of economic well-being (size and condition of house, appliances, etc.).

There is no single solution to the team exercise (based on the Tanzania case or the participants' own cases). Probably, if the government's hypothesis (see Case Description) is the most important aspect of the survey, the breakdown for non-NMC villages should be 1, 2, and 1, although this gives 40% representation to a category of villages that represents only 21% of the total. This should inspire some discussion.

The solution to the household selection problem is fairly straightforward: 12, 24, and 4. The bigger issue is how to identify and classify households.



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IN-CLASS EXERCISES FOR ACTIVITY 10

SAMPLE CASE STUDY - SAMPLE SELECTION PROBLEMS

In this activity, we will select a sample number of sites for field study. We will do this on the basis of what we know about differences among sites that are likely to affect nutrition. If we knew nothing in advance and wished to draw a statistically useful sample, we would draw a random sample in which each household, village, or other unit had an equal chance of being selected. This would require a much larger sample, which would render the rapid reconnaissance unfeasible. Or if we simply drew a small number of villages at random, we could have far less confidence that the villages were representative of villages in the region as a whole.

In this exercise, information is supplied for population size, agro-ecological zones, access to markets, ethnicity, and cultural-economic practices, all of which are felt to affect, directly or indirectly, nutritional status. In actual practice, other factors would probably intervene. For the sake of this exercise, it is assumed that time and funding constraints limit the project to 8 field workers for a period of 5 weeks. Assume that the interviewers will be divided into teams of 2, and that each team will spend 2 weeks in each of 2 villages, so a total of 8 villages will be surveyed.



The Region

The target populations are small to medium agriculturists with landholdings ranging from 10 to 2 hectares, classified as irrigated, humid, or marginal. They raise some dairy cattle, as well as minor livestock and kitchen gardens.

Ninety percent of the population live in villages ranging from 1,000 to 5,000 population. The mean village population is 1,500. There are 73 villages in the target area, four of which are market centers. Not all of the villages are equally well integrated into the regional market system. Those which are more distant from market centers and roads consume fewer consumer goods and go less far afield to seek temporary work. Thirty-two of the villages are considered to be integrated into the market system.

Two linguistic/cultural groups are represented, Group A and Group B. There are 23 Group B and 50 Group A villages. Notice that this characteristic cuts across other characteristics. The ecology of the area can be roughly divided into two zones, one relatively flat with some annual flooding and a high water table, the other hilly to mountainous. Both areas produce grains and legumes, but in different proportions, and average annual yield differs between the two areas.

Fifty of the villages are in the lowlands and 23 are in the



highlands. Of the highlands villages, 17 are Group B and 6 are Group A. Of the lowland villages, 44 are Group A and 6 are Group B. All four of the market centers are in the lowlands and are dominated by Group A. Of the integrated villages, all are Group A.

Choosing a Sample

Step 1. Determine how many sites are to be selected based on time and the number of field workers available. The number of sites in this exercise is eight.

(Time Out)

Beginning in the next step, there is more than one way of reaching the same goal. One way is to calculate the weighting for each characteristic and multiply the weightings to get the single weighting for the villages having all those characteristics. For example, take the group of villages in the sample that are lowland, Group A, integrated, and non-market. Fifty percent of the 73 villages, or 68%, are in the lowlands. Forty-four of the 50 lowland villages (88%) are Group A. Thirty-two of the 44 lowland Group A villages (72.7%) are integrated into the cash economy, and 28 of these 32 (87.5%) are not market towns and match the other criteria of the group. Multiplying these percentages gives 38.1% for the category as a whole. Multiplying that by eight (number of villages in the sample) gives us a figure of 3.05, which is the number of villages in this category that should be in the sample.



A general formula for this procedure is as follows:

$$\frac{(C_1 C_2 \dots C_m) \ nS}{N \ nC_2 \ nC_3 \dots nC_m}$$

where C_i is a characteristic of the population, nS is the number in the sample, m is the number of the last characteristic considered, N is the number in the population, and nC_i is the total number of cases exhibiting the i th characteristic.

BUT THERE IS AN EASIER WAY!

Step 2. All you need to do is count the actual number of villages that fall into each category and list them (the total of the villages in the categories should equal the total number of villages in the population).

Step 3. Now figure the percentage of the total number of villages each represents, and multiply that figure by the total sample =8. This is done in the table below.



<u>Site Type</u>	# of Sites	% of Total	Sample Size
Lowland, integrated, Group A, market center	4	5.48	0.44
Lowland, integrated, Group A, non-market	28	38.36	3.07
Lowland, non-integrated, Group A	12	16.44	1.32
Lowland, non-integrated, Group B	6	8.22	0.66
Highland, Group A	6	8.22	0.66
Highland, Group B	<u>17</u>	<u>23.29</u>	<u>1.86</u>
	73	100.01	8.01

Step 4. Now come the judgment calls! The obvious problem is that we cannot survey 0.44 villages. If we simply rounded off, the first category of villages would not be represented in the sample. To avoid that, you might take one sample village away from the second category and give it to the first; that would do some violence to our proportional sampling, but no category would be left out. But, again, that is a judgment call and would have to be based on more information than we have here.

One "solution" to the problem: Now we know how many sites of each category we may want to select for research.



Final site selection:

Site Type	Total	Sample	%
Lowland, integrated, Group A, market center	4	1	25
Lowland, integrated, Group B, non-market	28	2	7
Lowland, non-integrated, Group A	12	1	8
Lowland, non-integrated, Group B	6	1	17
Highland, Group A	6	1	17
Highland, Group B	<u>17</u>	<u>2</u>	<u>12</u>
TOTALS:	73	8	11

Next, we number the sites in each category from 1 to N (the total number in the category); then, using a table of random numbers, we select the sites for each category. While we are at it, we should select one or two alternative sites for each category in case it should become impossible to work in one of the first choices. This is an important step. Should we choose the sites casually, even after this degree of stratification, it would likely be on the basis of accessibility, having a contact in the village, or some other factor that could bring hidden biases to the sample.

This sample, although a great improvement over a simple random sample, should still not be considered as the basis for complex statistical inferences about the population as a whole. That would



require a great deal more prior information and considerably more confirmation of our assumptions about causes of nutritional status.



FILE

MATERIALS FOR PARTICIPANTS

TEAM EXERCISE FOR ACTIVITY 10

Now that you have your interview schedule complete (Activity 9), you can decide in this exercise where you want to do the interviewing. The following information relates to the Tanzania case and the situation outlined in the exercise for Activity 9. However, numbers representing different kinds of villages (and the kinds of villages themselves) are spurious, made up just for the sake of this exercise. If your own knowledge and experience indicate that other numbers would be more likely to be accurate, then use your own numbers; or, if you are working on a case from your own assigned country, then substitute it.

Using the results of research on nutrition studies reported in the case description for Tanzania (pp. 22 ff.), we can suggest whether or not food is grown locally should affect nutrition. Also, we wish to test the government's hypothesis that, where official market outlets are available, food should be cheaper and therefore nutrition should be better. Considering just these two factors, we divide 61 imaginary villages in Tabora as indicated in the following table.



Table 1. Breakdown of Tabora Villages

Type of Village	Total	Within Range of NMC Market Outlet	Not in Range of NMC Market Outlet
Food producer	14	4	10
Mixed (village produces cotton, individuals grow food)	31	6	15
Migrant wage laborers	16	3	13
Totals	61	13	38

Assume further that you have funding to put 5 two-person teams in the field for 4 weeks per year for 2 years.

Problem: How would you allocate your interview teams?

(Hint: All of these will require judgment calls, and it will probably be necessary to violate the principle of strict proportionality in order to test the government's hypothesis.

FOR FURTHER DISCUSSION: Once you have assigned teams to villages, how should they go about picking households for interviewing? For example, assume that a team in one village finds that there are roughly three economic categories of households: landless wage laborers, wage laborers with subsistence plots of less than 2 hectares, and petty entrepreneurs. The respective numbers are 21, 42, and 8. The interviewers feel they can complete 40 interviews in 2 weeks. Whom should they interview?





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